
Volume 2
Number 4
1992

NOVON



Neviusia cliftonii (Rosaceae: Kerrieae), an Intriguing
New Relict Species from California

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ABSTRACT. A second species is added to *Neviusia* (Rosaceae: Kerrieae), previously known as a single rare species in the southeastern United States. The new species, *N. cliftonii* from northern California, differs from *N. alabamensis* primarily in having petals, fewer stamens, and more broadly ovate, coarsely toothed leaves. The relict nature of *Neviusia* is further supported by newly recognized fossils from the Eocene of British Columbia, Canada.

During the course of conducting botanical investigations in northern California in May 1992, the third author and Glenn L. Clifton stopped at an exposed limestone area on California Highway 299 east of Redding that had intrigued them for several years. At the base of a shaded north-facing slope, they collected a puzzling rosaceous shrub that they could not recognize to genus. It was shown to the senior author, who, after collecting additional material and confirming the shrub as Rosaceae, enlisted the assistance of the second author, who was in the midst of preparing the treatments of several rosaceous genera for *The Jepson Manual: Higher Plants of California*.

After all Rosaceae in various western floras (e.g.,

Munz, 1959; Hitchcock et al., 1961) were eliminated, the shrub was keyed to tribe Kerrieae in Hutchinson (1964). Kerrieae has usually been circumscribed to include three monotypic genera: *Kerria* DC. and *Rhodotypos* Siebold & Zucc. of eastern Asia, and *Neviusia* A. Gray of the southeastern United States. A comparison with herbarium material at CAS-DS and UC-JEPS indicated that the shrub was unequivocally *Neviusia*, to the extent that an initial suspicion was that the California material represented an escape from cultivation. Subsequent detailed morphological examination, however, supplemented by the discovery of two additional populations the following month, confirmed that it was indeed a distinct new species of *Neviusia*, the first addition to the tribe in 134 years. The key differences follow:

KEY TO THE SPECIES OF *NEVIUSIA*

- 1a. Petals absent; leaves narrowly ovate to ovate, finely toothed; stamens ca. 100+, 4–7 mm long; sepals 3.5–10 mm long, oblanceolate-obovate to elliptic, with 6+ teeth; style 5–6 mm long; southeastern United States . . . *N. alabamensis*
- 1b. Petals present, white, oblanceolate, 4–6 mm;

leaves ovate to cordiform, coarsely toothed; stamens ca. 50+, 4–5 mm long; sepals 3.5–6 mm long, \pm obovate with ≤ 6 teeth; style ± 3 mm long; northern California *N. cliftonii*

Neviusia cliftonii J. Shevock, B. Ertter & D. Taylor, sp. nov. TYPE: United States, California: Shasta Co., along Highway 299 7.4 road mi. W of Round Mountain post office, ca. 25 mi. E of Interstate Highway 5, T34N R1W Sec. 29 NWNW, ca. 1,450 ft. elevation, understory of mesic, north-facing, conifer-dominated forest on Hosselkus limestone, 5 May 1992, *D. W. Taylor & G. Clifton 12513* (holotype, JEPS; isotypes, CAS, GH, MO, NY). Figure 1.

A *N. alabamense* floribus petaliferis (petalis parvis albis), foliis obovato-cordatis grosse dentatis, necnon staminibus circa dimidio minus numerosis ± 50 (nec 100+) 4–5 (vs. 4–7) mm longis differt.

Diffuse slender-branched understory shrub, stems erect, generally several, rarely > 1 cm diam., the bark grayish near base, \pm reddish brown above, \pm exfoliating in strips, without obvious lenticels; herbage and young twigs \pm strigose, the hairs ± 0.4 mm long; leaves alternate, primarily in upper $\frac{1}{3}$ of plant, generally expanded at anthesis, the stipules linear-setaceous, free from the 4–10(–15)-mm-long petiole, often with small reddish glands, the leaf blade ovate to cordiform, 2–6(9 on sterile shoots) cm long, 1.5–5(–7) cm wide, \pm bicolored, bright green and sparsely strigose above, pallid and more densely strigose below, the venation craspedodromous with 3–8 2° veins per side, the margin coarsely toothed and shallowly lobed, the teeth apiculate; inflorescence \pm umbellate-corymbose, terminal, mostly on short side branches, not otherwise pedunculate, the pedicels 1–3 cm long, very slender, ca. 0.3 mm thick (widening above); flowers (1–)3–5(–10), appearing after or with leaves, the hypanthium \pm flat, \pm glabrous, 2–3 mm diam. (pressed); sepals 5–6, \pm obovate, 3.5–6 mm long, 2–4.5 mm wide, veiny, irregularly few-toothed distally, spreading at anthesis, persisting in fruit; petals oblanceolate, 4–8 mm long, white, quickly deciduous; stamens many, ca. 50 or more, ca. equaling sepals, the filaments 4–5 mm long, white, \pm dilated, the anthers round, 0.3–0.4 mm long, yellow; pistils 3–6, the ovary densely white-strigose, the style ± 3 mm long, sparsely strigose; fruit \pm eccentrically ovoid achene, 3–4 mm long, brown, sparsely strigose.

Paratypes. UNITED STATES, CALIFORNIA: Shasta Co., type locality, 8 May 1992, *Shevock 12127* (CAS, JSU, K, KYO, RSA, UARK, UC, US), 19 May 1992, *Taylor 12584* (HSC, JEPS, KUN, NA), 27 May 1992, *Pap-*

palardo & Molter s.n. (CHSC, Shasta-Trinity National Forest herbarium), 13 June 1992, *Shevock & Ertter 12192* (B, BM, CAS, GH, F, GH, ILLS, JEPS, JSU, LE, MAK, MO, NAS, NY, PR, RM, RSA, TEX, UBC, US, VDB, WTU); along Shasta-Trinity National Forest road 27, 0.6 mi. N of Squaw Creek Forest Service station, T35N R2W Sec. 20 NENE, 1,200 ft., 13 June 1992, *Shevock & Ertter 12197* (ARIZ, CAS, CPH, DAV, JEPS, NCU, NY, OBI, OSC, PE, RSA, SBBG, UC, UCR); along Shasta-Trinity National Forest road 7H009 at Ellery Creek on McCloud River Arm of Shasta Lake, T35N R3W Sec. 6 SE $\frac{1}{4}$, 1,250 ft., 13 June 1992, *Shevock & Ertter 12199* (CAS, CHR, IBSC, LA, SD, UC).

Eponymy. Named in honor of one of the discoverers, Glenn L. Clifton (1943–), ardent collector of the California and western United States flora. His 30,000 specimens distributed among 6,000 species, including numerous significant collections, form a major portion of the holdings at Pacific Union College (PUA). We suggest “Shasta Snow-wreath” as a euphonious vernacular name, parallel to the established name of “Alabama Snow-wreath” for *N. alabamensis*.

Ecology. The three known occurrences are well spaced around the eastern half of Shasta Lake northeast of Redding, 60–80 km south of Mount Shasta, with an elevation range between 300 and 500 m. All sites are on limestone substrates in shaded cool-air canyons adjacent to creeks; similar situations on other substrates were searched without finding any *Neviusia*. Limestone, relatively rare in northern California, is centered around Shasta Lake, where access to many areas is extremely limited due to the rugged, densely forested terrain with few roads or trails. Limestone is likewise a common substrate for *N. alabamensis*, which also occurs on sandstone, sandy loam, and shale.

The ecological setting in which the *N. cliftonii* populations occur is typically very species-rich, including species at their northern or interior range limit. Associated species include the following: *Acer macrophyllum* Pursh, *Aesculus californica* (Spach) Nutt., *Arbutus menziesii* Pursh, *Aristolochia californica* Torrey, *Asarum hartwegii* S. Watson, *Berberis aquifolium* Pursh var. *dictyota* (Jepson) Jepson, *Calycanthus occidentalis* Hook. & Arn., *Cercis occidentalis* Torrey ex A. Gray, *Clematis lasiantha* Nutt., *Corylus cornuta* Marsh var. *californica* (A. DC.) Sharp, *Cornus sericea* L., *Cornus sessilis* Durand, *Holodiscus discolor* (Pursh) Maxim., *Ligusticum californicum* L. Coulter & Rose, *Lonicera hispidula* Douglas var. *vacillans* A. Gray, *Paxistima myrsinites* (Pursh) Raf., *Philadelphus lewisii* Pursh subsp. *californicus* (Benth) Munz, *Physocarpus capitatus* (Pursh) Kuntze, *Polygala cornuta* Kellogg, *Prunus subcordata* Benth, *Pseu-*

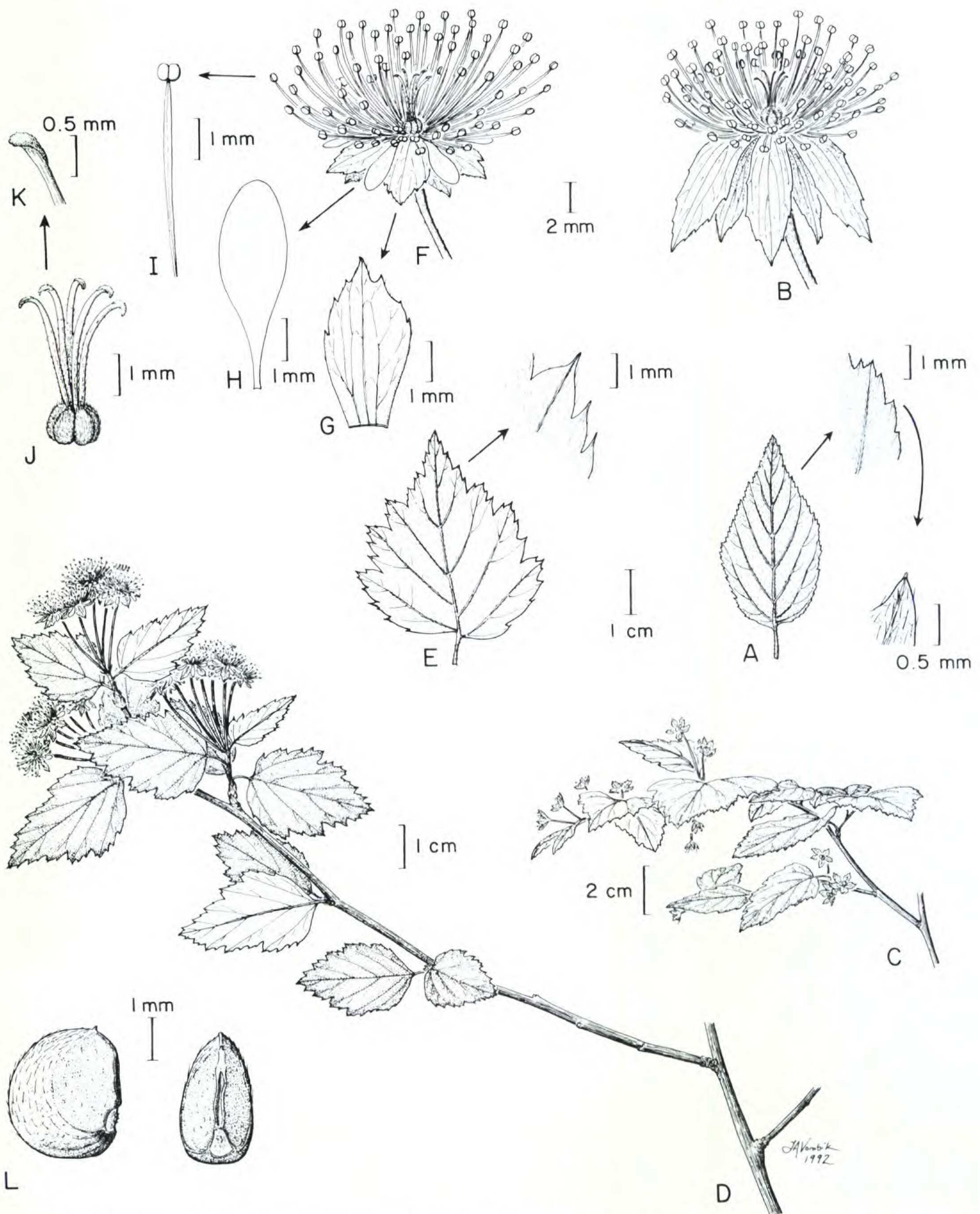


Figure 1. *Neviusia cliftonii* and comparison to *N. alabamensis*. A, B. *N. alabamensis*. —A. Leaf, with details of margin. —B. Flower. C–L. *N. cliftonii*. —C. Habit in life. —D. Branch (pressed). —E. Leaf, with details of margin. —F. Flower. —G. Sepal. —H. Petal. —I. Anther. —J. Gynoecium. —K. Stigma. —L. Achene.

dotsuga menziesii (Mirbel) Franco, *Quercus chrysolepis* Liebm., *Q. garryana* Hook. var. *breweri* (Engelm.) Jepson, *Q. kelloggii* Newb., *Q. wislizenii* A. DC., *Rosa gymnocarpa* Nutt., *Smilax californica* (A. DC.) A. Gray, *Styrax officinalis* L. var. *californica* (Torrey) Rehder, *Symphoricarpos*

albus (L.) S. F. Blake var. *laevigatus* (Fernald) S. F. Blake, *Toxicodendron diversilobum* (Torrey & A. Gray) E. Greene, *Trientalis latifolia* Hook., *Vitis californica* Benth, and *Whipplea modesta* Torrey.

Although the three known sites are relatively

accessible and *N. cliftonii* occurs there as a dominant understory shrub, it is still possible that the species may never have been previously collected. There are no misidentified CAS, DS, JEPS, or UC holdings of *Physocarpus* Maxim. (the genus it is mostly likely to be mistaken for, as it was in Arkansas (Moore, 1956)), *Holodiscus* Maxim., or *Spiraea* L. One potential cause is the prominent co-occurrence of poison-oak, *Toxicodendron diversilobum*, sufficient to discourage casual exploration. In addition, at the type locality along Highway 299 crossing Cedar Creek during peak flows can be difficult; however, 1992 marks the fifth year of drought in northern California.

Relationships. Kerrieae is a distinctive tribe characterized by serrate or imbricate persistent sepals, numerous stamens arranged in several series, and 1–8 drupaceous achenes (Baillon, 1869). As discussed by Robertson (1974), the tribe is morphologically intermediate between subfamilies Spiraeoideae and Rosoideae.

Neviusia alabamensis is apetalous and has 2–4 carpels; it is restricted to the southeastern United States. *Kerria japonica* (L.) DC., with five showy yellow petals and 5–8 carpels, is native to China and Japan. *Rhodotypos scandens* (Thunb.) Makino, also native to eastern Asia, has opposite leaves, large white petals, and 1–4 carpels. Hutchinson (1964) placed *Rhodotypos* in its own tribe, Rhodotypeae, based on the opposite leaves (unusual in Rosaceae) and two ovules per carpel.

Biogeographic significance. *Neviusia cliftonii* is a remarkable addition to the California Floristic Province. The immediate interpretation is that *Neviusia* is an old, formerly widespread genus with relicts in forest refugia separated by the uplift of the western Cordillera and the formation of the Great Plains. It is therefore immensely satisfying that, by serendipity, Wolfe and Wehr's (1988: 181) recent work came to our attention, wherein a fossil "aff. *Kerria*" is mentioned from early middle Eocene montane assemblages in the Pacific Northwest. Wolfe's suspicion (pers. comm.) that this fossil, from the Princeton flora of southern British Columbia, was probably closest to *Neviusia* was confirmed when he was given the opportunity to examine leaves of *N. cliftonii*. This also supports previous speculations that *N. alabamensis* is an epibiotic, relatively old relict species, whose current distribution follows the former edge of the Mississippi embayment of the old Gulf Coastal Plain (Moore, 1956; Robertson, 1974).

Similar California–eastern United States disjunctions are well known (Sharp, 1951; Wood, 1970); e.g., *Torreya*, *Dirca*, and *Calycanthus*. *Neviusia*

cliftonii occurs at the southeastern edge of Klamath-Siskiyou province of northern California, which contains the maximum concentration of arcto-tertiary relicts in California (Raven & Axelrod, 1978: 55–57). Counterparts to California–eastern North American relicts are also often present in eastern Asia, including *Torreya* and the Taxodiaceae. In the case of *Neviusia*, this would be the genus *Kerria* of Japan and China (Fernald, 1931). Several associates of *N. cliftonii* also represent this pattern to a greater or lesser extent.

Rarity Status. Based on the known distribution and extent of potentially suitable habitat, we believe that *N. cliftonii* will prove to be a relatively restricted and rare endemic in the Shasta Lake area. Mining is a very real potential threat; the Hosselkus formation is a high-quality source material for cement production and is the only such limestone in northern California (Bowen et al., 1973). Many accessible deposits throughout the region have already been mined. In addition, a recent major forest fire came perilously close to wiping out the type locality before the species was even described. We therefore recommend that *N. cliftonii* be considered as a candidate for the next addition to the U.S. Fish and Wildlife Service Notice of Review of plant taxa for listing as Endangered and Threatened Species in the *Federal Register*. It will be included in future editions of the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California*.

Neviusia alabamensis is also a candidate for either threatened or endangered status in the *Federal Register*. It is known from two sites in Alabama, three in Arkansas, three in Tennessee, one in Georgia, and one in Mississippi (element records from The Nature Conservancy, Arlington, Virginia). An occurrence in Missouri is presumed extirpated, as is the type locality in Alabama; goats are a potential threat to some extant populations (Rogers & Wilmes, 1989).

All three genera of Kerrieae are currently in cultivation. *Neviusia alabamensis*, in cultivation since its discovery in 1858 (Howard, 1976), has recently been promoted for native plant gardens (Rogers & Wilmes, 1989). It is generally propagated from softwood cuttings and is hardy as far north as Chicago and Boston. Cuttings and seeds of *N. cliftonii* have been given to the University of California Botanical Garden, a member of the Center for Plant Conservation.

Acknowledgments. The full significance of this exciting discovery has been amplified by the contributions of many other people, all of whom have

earned our deepest appreciation. Paleobotanists Jack Wolfe, Wesley Wehr, and Howard Shorn provided us with a fossil history of *Neviusia*. Forest Service botanist Julie Kierstead Nelson acquired maps showing limestone outcrops around Shasta Lake. David Whetstone of JSU gave us additional information on the morphology and ecology of *N. alabamensis*, as did The Nature Conservancy staff in Arlington, Virginia. Kenneth Robertson provided valued reviewer's comments. Linda Vorobik was able to fit a "need-ASAP" illustration into her crowded schedule, with no sacrifice of her usual high quality. Dieter Wilken granted an exemption to the "absolutely no more additions" barrier for including new discoveries in the *Jepson Manual*. Last, but certainly not least, Rupert Barneby checked and corrected the Latin, sharing our enthusiasm for this discovery.

Literature Cited

- Baillon, H. 1869. Monographie des Rosacées. Hist. Pl. 1: 345-483. 1869. [English translation by M. M. Hartog, The natural history of plants 1: 335-471. 1871.]
- Bowen, O. E., C. H. Gray & J. R. Evans. 1973. The mineral economics of carbonate rocks. Bulletin 194, California Division of Mines and Geology, Sacramento.
- Fernald, M. L. 1931. Specific segregation and identities in some floras of eastern North America and the Old World. Rhodora 33: 25-63.
- Hitchcock, C. L., A. Cronquist, M. Ownbey & J. W. Thompson. 1961. Vascular plants of the Pacific Northwest. Part 3: Saxifragaceae to Ericaceae. Univ. Wash. Publ. Biol. 17: 1-614.
- Howard, R. A. 1976. In defense of the Rev. Dr. Reuben D. Nevius and the plant called *Neviusia*. Arnoldia 36: 57-65.
- Hutchinson, J. 1964. The Genera of Flowering Plants. Clarendon Press, Oxford.
- Moore, D. M. 1956. *Neviusia alabamensis* in Arkansas. Rhodora 58: 187-191.
- Munz, 1959. A California Flora. Univ. California Press, Berkeley.
- Raven, P. H. & D. I. Axelrod. 1978. Origin and relationships of the California flora. Univ. Calif. Publ. Bot. 72: 1-134.
- Robertson, K. R. 1974. The genera of Rosaceae in the southeastern United States. J. Arnold Arbor. 55: 303-332, 344-401, 611-662.
- Rogers, G. & P. Wilmes. 1989. The Alabama snow wreath. Amer. Hort. (Alexandria) 68(4): 40-41.
- Sharp, A. J. 1951. Relationships between the floras of California and southeastern United States. Contr. Dudley Herb. 4: 59-61.
- Wolfe, J. A. & W. Wehr. 1988. Rosaceous *Chamaebatiaria*-like foliage from the Paleogene of western North America. Aliso 12: 177-200.
- Wood, C. E. 1970. Some floristic relationships between the southern Appalachians and western North America. Pp. 331-404 in P. C. Holt (editor), The Distributional History of the Biota of the Southern Appalachians. Part II. Flora. Virginia Polytech. Inst. State Univ. Res. Div. Monogr. 2.